Aspen Stand Structure Rapid Assessment Protocol
and
Trial Assessment of Twelve Aspen Stands

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I. Aspen Stand Structure Rapid Assessment Protocol

Purpose

This protocol (Otting and Lytjen 2003) allows for rapid assessment of an aspen stand's structure. The rapidity of the assessment allows for structural assessment of numerous stands across a landscape. This provides complementary information to that gained by rapid assessment of browsing (e.g., O'Brien 2007)

Brief Summary of the Protocol

Using a $100m^2$ plot, cover is recorded for three crown positions: Overstory, recruitment, and understory. Additional information can be gathered, e.g., photo documentation; notes on slope, understory forbs, shrubs, and grasses; or stem ages).

Method

1. CORE STRUCTURAL INFORMATION
    a. Place a 5.62 m radius plot ($100m^2$) within a location typifying the stand
    b. Denote location characteristics as relevant, e.g.,
        i. GPS location
        ii. Livestock allotment (if relevant)
        iii. District, Forest
        iv. Elevation
        v. Nearby features
    c. Visually estimate cover of understory, recruitment, and understory aspen within the plot.
        i. *Overstory trees* are equal to or greater than 75% of mature stand height (which varies according to site conditions).
        ii. *Recruitment trees* are equal to or greater than 2 m tall and up to 75% of mature stand height.
        iii. *Understory trees* are less than 2 m tall.
    d. *Senescent overstory*: Determine the percent of overstory trees that are dead or showing signs of decline, including many dead limbs, conks, or weeping cankers.

2. ADDITIONAL INFORMATION, AS DESIRED
    a. Digital photographs may add to the information, e.g., a photo of

i. *General aspect* of the stand, taken horizontally from the center of the plot
ii. *Overstory aspen* taken directly up in the center of the plot
iii. *Understory forbs and grasses,* taken at an angle down, from the center of the plot

b. Brief notes may add to the information, e.g.,
i. Approximate size of the stand
ii. Slope
iii. Understory forbs, grasses, shrubs
iv. Ungulate (wild, livestock) scat

c. Stem ages – e.g., sampling of recruitment layer initiations, using standard coring methods

Quantitative Analysis

Depending on the purpose of the rapid assessment, any or all of the following quantitative analyses are easily generated for a given group of stands if data are entered into an Excel table:

1. Average percent cover of overstory, recruitment, and understory aspen
2. Proportion of stands with senescent overstory in plots
3. Percent/proportion of stands sampled that are
    a. *Single-tier stands*: Recruitment tree cover 0-0.3 times that of the overstory
    b. *Two-tier stands*: Recruitment tree cover 0.4-1.7 times that of the overstory; sparse understory trees.
    c. *Multi-age stands*: Overstory cover less than 65%; recruitment cover 0.4-1.0 of the overstory; and more than 5% cover of understory trees.
    d. *Replacement stands*: Recruitment cover is over 40%; and more than 1.7 times that of the overstory.

Qualitative Analysis

Given that numerous stands can be sampled rapidly in an area, the following are examples of what can be provided:

1. Relevant notes for each stand and/or a particular group of stands.
2. Digital photographs illustrating particular points can be provided
3. A map showing each stand (e.g., using TOPO! and GPS locations.

Advantages of the Protocol

- Rapid. The major “time” involved in assessing the aspen stands using this methodis moving between the aspen stands in the set being assessed.
- Simple; 2-3 hours of training suffices
- Quantified, with added qualitative options
- Can be done by one person
- Easily repeated
- Provides information on a key ecological condition: the current structure of a set of aspen stands. The “set” of aspen stands could be those in a given watershed, allotment, district, or other landscape or political entity.

A note: This protocol was developed and used by Nick Otting and Danna Lytjen to examine 129 aspen stands in Steens Mountain of southeastern Oregon. The aspen stands examined were not mixed with conifers. This protocol would need to be altered for use in mixed aspen/conifer stands to document the presence and structure of conifer as well as aspen.

II. Trial Rapid Assessment of Aspen Structure: Twelve Aspen Stands

Mary O'Brien and Nick Otting
August 21-23, 2007

Methods

On August 21-23, 2007, the structure of twelve aspen stands in four disparate locations and three allotments in the Tushar Mountains, Beaver Ranger District, Fishlake National Forest was assessed using the rapid assessment protocol described above. The following variations on the core protocol described above were used:

1. In the first location, *overstory senescence* was determined as the number of overstory trees exhibiting cankers or boles. In the other three locations, overstory senescence was merely noted as absent or present. In the future, we will use the original protocol: percent of overstory trees within the plot exhibiting senescence.
2. The GPS location of each stand and photograph was linked to digital photographs using GPS Photo-Link. IN each stand, photos were rapidly taken of the stand in general, overstory, and understory forbs/grasses/shrubs, and
3. Brief notes were taken on the understory forb, grass, and shrub species, and ungulate scat was noted.

Results

1. **Pine-Creek Sulphurbeds Allotment, near Wittwer Hill (Table 1)**
    a. This location was selected by examining a Pine Creek-Sulphurbeds Allotment map of major biological communities. It was mapped as having "stable" aspen (i.e., aspen not mixed with conifer).
    b. This is a group of scattered, largely one-tier aspen stands (recruitment cover 0.16 of overstory cover) with older trees exhibiting moderate senescence. Moderate cattle use is present with little aspen recruitment except in stand # 4 with dense snowberry that may impede cattle access.

2. **Ten Mile Allotment, Mount Holly Club area (Table 2)**
    a. This location in the northwestern corner of Ten Mile Allotment was selected by examining a Ten Mile Allotment map of major biological communities. It was mapped as having "stable" aspen (i.e., aspen not mixed with conifer).
    b. This group of multi-age aspen stands is on steep slopes. The overstory is mostly not senescent, but the understory aspen is being browsed. Recruitment is 0.51 of

overstory cover; and understory cover is 35%. Mixed conifer/aspen stands are nearby. The scat is of elk and deer; no sign of cattle use.

3. **Ten Mile Allotment, Price Spring area stand (Table 3).**
    a. This stand was selected as one of the more easily-accessed stands of pure aspen in Ten Mile Allotment. It is near Price Spring, which is heavily used by cattle.
    b. The two plots (#9 and #10) are in two portions of stand of old aspen that is breaking up.
    c. Plot #10 is, representative of the larger, single-tier portion of the stand: 25% overstory; 0% recruitment, and 2% browsed understory aspen.
    d. Plot #9 is in the smaller, replacement portion of the stand: Recruitment cover is 55%; and is 1.6 times the overstory cover; understory is 7%. Regeneration is apparently occurring due to the jackstrawed old aspen stems that have toppled. This has impeded cattle access.

4. **Cottonwood Allotment, Along Road 126 (Table 4).**
    a. Cottonwood Allotment, immediately north of Ten Mile Allotment, has not been grazed by livestock for ~30 years. The browsing that is occurring on the aspen is that of wild ungulates.
    b. Three of the four stands (Plots #9-#11) are single-tier stands, with recruitment cover (4.3% cover) only .09 of overstory (48.3%) cover. Understory cover (12.3%) is being browsed at approximately 50%, though this was not systematically measured.
    c. The fourth stand (Plot #12), is a small 0.5 acre stand on a ridge. It is a replacement stand, with 0% overstory, but 37% aspen recruitment cover, and 30% understory aspen cover.
    d. Understory forbs, grasses, and shrubs are diverse and moderately dense in these stands, but exotic Kentucky bluegrass remains dominant.

It is clear from just these twelve stands that aspen stands can be diverse within any given area (e.g., Plot #12 differs from Plots #9-#11; Table 4) and even within one large stand (e.g., Plots #9 and #10; Table 3). This is one reason that a rapid assessment for stand structure is desirable: it allows a series of stands to be assessed rapidly, thus allowing documentation of general landscape stand conditions, as well as informative exceptions.

Of the four locations sampled, the stands were largely single-tier in three locations (two of which are cattle- and elk-grazed, and in Cottonwood Allotment, which is grazed only by wild ungulates); and multi-age in only one location (wild-ungulate grazed, in a portion of a cattle allotment that is not easily accessed by cattle).

By definition, single-tier stands are not experiencing recruitment of young aspen into mature overstory. A wider sampling, both for browse and structure, of stands in Cottonwood Allotment, in which three of the four sampled stands were single tier, would seem wise, to determine whether wild ungulate pressure is too high on these stands.

Likewise, a wider sampling of Ten Mile and Pine Creek-Sulphurbeds Allotments will be important information for the Tushar Allotments Collaboration, which is contemplating future ungulate management within the two allotments.

Reference

Otting, Nick, and Danna Lytjen. 2003. *Steens Mountain Aspen Assessment and Monitoring: Final Report.* Submitted to Bureau of Land Management, Burns District Office, Hines, OR and Steens-Alvord Coalition of Oregon Chapter Sierra Club. Eugene, Oregon: Ducfoot Survey Company.

Table 1: Pine Creek/Sulphurbeds Allotment: Wittwer Hill Area								
Date	**PINE CREEK/ SULPHURBEDS ALLOTMENT**	**Stand #**	**Over-story cover (%)**	**Recruit-ment cover (%)**	**Under-story cover (%)**	**# Over-story trees senescen t**	**Conks/ borers? (Y=1; N= 0)**	**Comments**
Aug. 21, 2007	Fishlake NF; Beaver RD; **Witwer Hill area**; Pole Mountain Quad; 7,950' - 8,731'	1	45	10	2	0	0	30% slope. Large old trees breaking apart.; overstory senescence nearby Understory aspen: 4 browsed/ 2 unbrowsed. Snowberry, chokecherry, rose. Many cow patties; occasional deer/elk
		2	45	0	8	3	0	Small (~1 acre) stand on a saddle. Understory aspen: 12 browsed/ 0 unbrowsed. Cow patties.
		3	62	0	5	2	1	Large stand. Some break-up of old trees; understory aspen (mostly 1' or less tall): 9 browsed/1 unbrowsed. Sparse understory; snowberry.
		4	5	20	25	1	0	Essentially all understory (mostly 2'-3') aspen browsed. Low recruitment; Dense 5' tall snowberry (SYAL). Some cow/elk/deer scat; snowberry may be keeping most cattle out.
		5	25	0	4	0	0	10% slope. Most young aspen are beneath snowberry: 12 browsed; 4 unbrowsed. Snowberry, chokecherry, lupine; a sedge mostly not grazed by cattle. Borers at edge of stand in overstory.
		Ave.	36.4	6	8.8			

Table 2: Ten Mile Allotment: Mt. Holly Club Area								
Date	**TEN MILE ALLOTMENT**	**Stand #**	**Over-story cover (%)**	**Recruit-ment cover (%)**	**Under-story cover (%)**	**Senescent overstory trees present? (Y=1; N= 0)**	**Conks/ borers? (Y=1; N= 0)**	**Comments**
Aug. 22, 2007	Fishlake NF; Beaver RD; **Mt. Holly Club area**; Delano Peak Quad; Steep slopes 10,276' - 10,294';	6	45	20	35	1	0	Most understory aspen ~4', almost 100% browsed. 1 conifer. Sparse grass; native thistle, brome; a wheatgrass. High bare soil. Elk/deer sign, no cattle sign.
		7	4	25	30	0	0	30%, rocky slope. Overstory aspen only 18' tall. Native thistle, a stoloniferous snowberry, *Poa secunda*. Elk/deer sign; no cattle sign.
		8	40	0	40	0	0	30% slope. A 2-story stand; dense understory aspen. Heavy elk use.
		Ave.	29.7	15	35			

Table 3: Ten Mile Allotment: Price Spring Area								
Date	**TEN MILE ALLOTMENT**	**Stand #**	**Over-story cover (%)**	**Recruit-ment cover (%)**	**Under-story cover (%)**	**Senescent overstory trees present? (Y=1; N= 0)**	**Conks/ borers? (Y=1; N= 0)**	**Comments**
Aug. 22, 2007	Fishlake NF; Beaver RD; **Price Spring area**; Delano Peak Quad; 8,350' elev.	9	35	55	7	0	0	Overstory senescence and blowdowns in the area impeding livestock entry into stand.
		10	25	0	2	1	1	A creek running through the stand; understory aspen browsed; no aspen regeneration. Sagebrush, forbs chewed to less than 1". A sprawling aster, *Juniperus communis, J. ensifolius, Poa pratensis, Lupinus* sp., *Agrostis exarata*. *Ranunculus* sp. Heavy cattle sign.

Table 4: Cottonwood Allotment: Road 126								
Date	**COTTONWOOD ALLOTMENT**	**Stand #**	**Over-story cover (%)**	**Recruit-ment cover (%)**	**Under-story cover (%)**	**Senescent overstory trees present? (Y=1; N= 0)**	**Conks/ borers? (Y=1; N= 0)**	**Comments**
Aug. 23, 2007	Beaver RD; Fishlake NF; Four stands along Road 126; Delano Peak Quad; 9,205' - 9,667'	11	55	7	22	1	1	Isolated, mid-aged stand ~2 acres; understory aspen ~50% browsed. Diverse understory: KY bluegrass = dominant; *Elymus elymoides*, *Bromus carinatus*, native *Carex* sp.,small *Symphoricarpos* sp.
		12	50	3	10	1	1	10% slope. Regeneration at edge of stand; understory aspen being browsed. KY bluegrass = dominant; *Carex subfusca*, *Achnatherum*,*Elymus elymoides*, aster, native thistle, *Antennaria*, A small amount of white fir.
		13	40	3	5	0	0	10% slope; S-facing. Young stand, but overstory cover not high; understory aspen are browsed. KY bluegrass = dominant; *Stipa* sp. *Tragopogon dubius*, native thistle, dandelion, *Elymus elymoides*, *Bromus carinatus*, *Juniperus communis, J. scopulorum*
		14	0	37	30	0	0	On ridge, ~0.5 acre; KY bluegrass = dominant; *Elymus elymoides*, *Carex* sp.,*Solidago* sp.

Pine-Creek Sulphurbeds Allotment, near Wittwer Hill (Table 1; Aspen stands #1-#4)

This is a group of scattered, largely one-tier aspen stands (recruitment cover 0.16 of overstory cover) with older trees exhibiting moderate senescence. Moderate cattle use is present with little aspen recruitment except in stand # 4 with dense snowberry that may impede cattle access.

Aspen #1: General View

Aspen #1: 45% overstory

Aspen #2: Main stand

Aspen #2: Ground cover

Aspen # 3: General view

Aspen #3: Browsed understory aspen

Aspen # 4: Entering stand

Aspen #4. 5% Overstory cover [Note: Photo does not show entire area calculated]

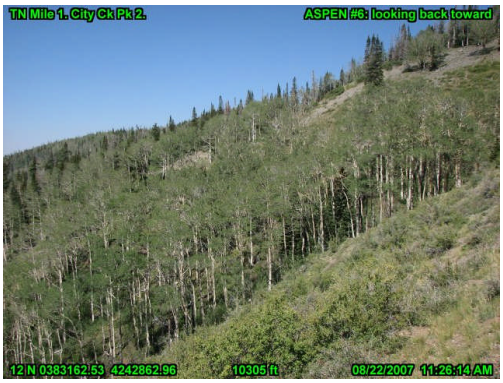
Aspen # 5: Entering stand

Aspen # 5: Ground, ungrazed sedge

Ten Mile Allotment, Mount Holly Club area (Table 2; Aspen stands #6-#8)

This group of multi-age aspen stands is on steep slopes. The overstory is mostly not senescent, but the understory aspen is being browsed. Recruitment is 0.51 of overstory cover; and understory cover is 35%. Mixed conifer/aspen stands are nearby. The scat is of elk and deer; no sign of cattle use.

Aspen # 6: General view



Aspen #6: Looking back toward stand

Aspen # 7: General

Aspen # 7: In distance

Aspen # 8: General view

Aspen # 8: 40% overstory cover

Ten Mile Allotment, Price Spring area stand (Table 3; Aspen stands #9-#14).

- The two plots (#9 and #10) are in two portions of stand of old aspen that is breaking up.
- Plot #10 is, representative of the larger, single-tier portion of the stand: 25% overstory; 0% recruitment, and 2% browsed understory aspen.
- Plot #9 is in the smaller, replacement portion of the stand: Recruitment cover is 55%; and is 1.6 times the overstory cover; understory is 7%. Regeneration is apparently occurring due to the jackstrawed old aspen stems that have toppled. This has impeded cattle access.

Aspen # 9: Aspen among slash

Aspen # 9: 35% Overstory cover, with senescence

Aspen # 10: General view

Aspen # 10: 25% Overstory cover with senescence

Cottonwood Allotment, Along Road 126 (Table 4; Aspen stands #11-#14).

- Cottonwood Allotment, immediately north of Ten Mile Allotment, has not been grazed by livestock for ~30 years.
- Three of the four stands (Plots #9-#11) are single-tier stands, with recruitment cover (4.3% cover) only .09 of overstory (48.3%) cover. Understory cover (12.3%) is being browsed at approximately 50%, though this was not systematically measured.
- The fourth stand (Plot #12), is a small 0.5 acre stand on a ridge. It is a replacement stand, with 0% overstory, but 37% aspen recruitment cover, and 30% understory aspen cover.
- Understory forbs, grasses, and shrubs are diverse and moderately dense in these stands, but exotic Kentucky bluegrass remains dominant.

Aspen # 11: General View

Aspen # 11: Ground cover

Aspen # 12: General view

Aspen # 12: Regeneration at edge of stand

Aspen # 13: General view

13: Ground cover

Aspen # 14: Recruitment, multi-age

Aspen # 14: Dense recruitment